

Appendix A

Description of Treatments, Standard Management Requirements, and Monitoring

Table 1. Description of Treatments

Treatment	Description
Primary Treatments	
Clearcut	A timber harvest method in which all or almost all of the merchantable timber is removed in one cutting, and the stand age would be reset to zero. The objective of this treatment is to remove all but 6-12 trees per acre and fully expose the site for the development of a new age class. This treatment usually favors shade intolerant species such as jack pine, aspen, or paper birch. Reserve trees are left according to standard management requirements for wildlife and diversity. In clearcuts larger than 20 acres a minimum of 5% of the stand will be retained in legacy patches of live trees, where no harvest would occur. Where possible the legacy patches should be greater than two acres in size.
Partial Cut Harvest	A timber harvest in which a portion of the merchantable timber is removed in one cutting. The objectives of partial cuts are to either convert a stand from hardwood to conifer or to establish a two-aged stand. There will be two types of partial cutting used in this project.
Partial Cut 30BA (Lower Residual)	Treatment includes harvesting some trees while leaving others to provide sufficient shade that will retard the aspen regeneration and create a microenvironment suitable for natural and artificial conifer regeneration. 30-40 square feet of basal area per acre of tree species that most represent the stand will be reserved, also including reserve trees left according to standard management requirements for wildlife and diversity. This treatment usually favors long lived tree species and the age of the stands receiving this treatment will be reset to zero.
Partial Cut 70BA (Higher Residual)	Treatment includes harvesting some trees while leaving others to provide sufficient shade that will retard the aspen regeneration and create a microenvironment suitable for natural and artificial conifer regeneration. 50-70 square feet of basal area per acre of tree species that most represent the stand will be reserved, also including reserve trees left according to standard management requirements for wildlife and diversity. This treatment usually favors long lived tree species and is used to create a more uneven aged forest. After receiving this treatment the stands data will remain at the current stand age.
Shelter Wood Cut	A timber harvest method in which 80% of the merchantable timber is removed, leaving 20% of a preferred species evenly throughout the cut, utilizing the species left uncut for seed production
Seed tree Cut (Harvest)	A treatment method in which an area is clear-cut except that certain trees, called seed trees, are left standing singly or in groups for the purpose of furnishing seed to restock the harvested area.
Seed Tree Clumping	The removal of all the mature timber from an area in one cut, except for leaving a number of ¼ acre clumps of mature timber throughout the stand and reserve trees left according to standard management requirements for wildlife and diversity. The objective of this treatment is to regenerate the stand through natural seeding created through the ¼

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	acre mature clumps. This treatment usually favors shade intolerant species such as paper birch. The age of the stands receiving this treatment will be reset to zero.
Thinning	The objective of thinning is to remove some trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water and sunlight. In addition, thinning utilizes material that would normally be lost due to natural stand mortality. Trees designated for harvest would generally be ones exhibiting slower growth rates, signs of insects or disease infestations, overcrowding (where crowns are touching) or damage from either natural disturbances or previous management. Access strips (approximately 14 ft. wide placed approximately 30 ft apart) would be needed and all trees within these strips would be removed to allow machinery to move through the stand and would be used for access in future treatments.
Variable Thinning	The objective of variable thinning is to remove some trees in a stand in order to increase structural and compositional diversity. Remaining trees will grow faster due to reduced competition for nutrients, water and sunlight. This technique would utilize leave islands (or groupings) of trees and designate different basal area objectives in different portions of each stand. Variable thinning would primarily favor the retention of red pine trees along with other species that are different from the dominant forest type. Retention of birch, cedar, and other hardwoods will improve habitat for cavity nesters and provide foraging habitat for birds.
Release	The selection and release of a desirable species by removing the adjacent competing vegetation. The objective of this treatment is to reduce over-crowding of young planted trees and to reduce mortality and competition for nutrients, water and sunlight for the desired species.
Mechanical Fuels Reduction	The understory hazardous fuels are removed from a stand with mechanical means. The understory hazardous fuels include dead and down material and ladder fuels. The understory fuels may be piled and burned, crushed, chopped, or removed with mechanical equipment. The overstory of the stand will be left undisturbed. The objective of mechanical fuel reduction projects is to reduce the understory hazardous fuels of the designated stands. Removing the understory fuels reduces the risk of a wildfire being able to spread into the canopy of a forest and spread as a crown fire.
Hand Pile and Burn	The understory fuels will be piled by hand crews and burned under appropriate weather conditions. The overstory of the stand will be left undisturbed. The objective is to reduce understory hazardous fuels that have accumulated.
Broadcast Burn	A broadcast burn is a fire that is allowed to burn over the entire unit. Burn intensity varies over the treatment unit depending on vegetation, fuels, and topography. The purpose of the broadcast burns within this project area is to improve wildlife habitat. The prescribed burn will reduce the accumulated grass and shrub layer and put nutrients back into the soil to promote new growth of grass and shrub which have a higher nutrient content for wildlife.

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Secondary Treatments	
Mechanical Site Preparation	The objective of this treatment is to reduce vegetation and slash and expose mineral soil. This eliminates competition for light, water and nutrients for the newly seeded or planted trees.
Pruning	The removal of the lower and infected limbs of young white pine. The objective of this treatment is to reduce or prevent the infestation of white pine blister rust (fungal disease). White pine blister rust infects young white pine generally by entering needles on the lower shared branches of white pine. It then travels through the branch to the trunk of the main stem, where it then kills the tree above that branch.
Mechanical Pile And Burn	The fuels created by logging, such as tree tops and slash will be mechanically piled and burned under appropriate conditions. The leave trees or islands of the stand will be left undisturbed. The objective is to reduce the hazardous fuels created by harvesting.
Under Burn	A low intensity fire that burns beneath the canopy of live, standing timber. The primary objective of underburns is to reduce hazardous fuels in the understory. The fire removes material that is considered a fuel ladder that could potentially spread fire from the ground fuels into the crown of standing live timber. The understory materials that would be removed include small down, dead, woody material. Underburns also kill shrubs and most young trees that compete with the overstory canopy vegetation. Some live trees may be burned during understory burns, but the objective is to maintain the forest cover. Following the burn, the stand would consist of a standing forest that is open underneath.
Interplanting	Planting that occurs after a timber harvest method such as a Partial Cut 30BA residual, Partial Cut 70BA residual, or Seed Tree Clumping. Planting 200-400 seedlings per acre, 10'x10' or 14'x15' spacing under a partial canopy of mature timber. The objective of this planting method is to increase within stand diversity by utilizing natural regeneration along with the desired planted species.
Plant	Planting that occurs after a timber harvest method such as Clearcut with Reserves. Planting a desired species at approximately 400-600 seedlings per acre in a 8'x 9' spacing in a fully open canopy.
Transportation Management	
Forest System Roads	The objective of these classified roads is to provide long term access to an area. They may be used in the project and will also be needed in the future to access the area for recreation, timber harvest or other administrative need. Each road is assigned an Objective Maintenance Level (OML) which indicates the standard of maintenance and often indicates whether the road is open or closed to vehicular traffic. OML 2 roads are open for use by high clearance vehicles.
Temporary Roads	The objective of these roads is to provide short term access. Once the need for access has expired, the road will be obliterated. All temporary roads needed to access harvest units will be obliterated

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	<p>and allowed to return to a more natural state once reforestation objectives have been met. The following actions will occur where appropriate:</p> <ul style="list-style-type: none"> ▪ Culverts and temporary bridges will be removed. ▪ Stream crossings will be returned to a more natural state by returning the crossing to the approximate original contour and by stabilizing the crossing banks through re-vegetation. ▪ Original drainages will be reopened to and water diversions from roadbeds will be provided. ▪ Water bars will be constructed on temporary roads or skid trails in areas with steep slopes. Areas at risk for erosion will be seeded. ▪ Windrows of slash or rock along temporary roads will be flattened or spread out. ▪ Where available nearby small balsam and spruce will be transplanted into road bed and one cubic yard and larger rocks (embedded 1/3 of their depth), stumps, and slash will be randomly placed on the seen part of the road to ensure that passage does not seem feasible and is not attempted. Cuts and fills will be re-contoured to pre-road condition. <p>At the access point off the main road, the original ditch will be restored.</p>
Decommission	Unclassified roads planned for decommissioning shall meet the standard management requirements for closure of the temporary road.

Standard Management Requirements Common to All Harvest Treatments

Threatened, Endangered, and Sensitive Species

Where adverse impacts to known TES species can be minimized or avoided, a site-specific design criteria/mitigation measure would be identified. Examples of unit specific design criteria/mitigations include measures such as seasonal restrictions or protective buffers. Where identified, follow unit specific design criteria and mitigations to protect TES, MIS or other species of interest that are known to occur in or adjacent to a treatment unit and are likely to be affected by management activities.

If a goshawk territory is found, suspend harvest until a home range analysis can be conducted on the new site. If there will be enough suitable habitat (using criteria above) remaining after the proposed harvest, continue with the operation. However, if the proposed harvest will lower the suitable upland habitat to levels below the threshold, defer the harvest unit.

If management activities threaten any known, active wolf or lynx dens, these activities would be delayed until after the wolves or lynx have finished using the den site.

If any threatened, endangered, sensitive or other plant and animal species of interest or their nests, dens or roost trees are found during planning, layout, or operations, activities would be temporarily halted in the area. The District Biologist would be consulted and appropriate

mitigation measures would be carried out prior to restarting operations. The Forest Plan, recovery plans and conservation strategies will be used when making mitigation recommendations, one of such options would be to buffer the stick nest with a 2 chain radius no treatment area.

Vegetation for Wildlife and Diversity

In stands 20 acres or larger that were regenerated with clearcuts, retain a minimum of 5% of the stand in legacy patches of live trees where no harvest occurs. Legacy patches should be at least two acres in size wherever possible and no less than $\frac{1}{4}$ acre. When locating patches consider including important features such as wetland inclusions, seasonal ponds, riparian areas, forested corridors, den trees, cavity trees, trees with stick nests, large mature white pine, rare plant locations and rare native plant communities.

In general, retain a minimum of 6-12 live leave trees per acre to provide present and future benefits including shelter, resting sites, cavities, perches, rest sites, foraging sites, mast, and coarse woody debris. The trees will be at least six inches in diameter for hardwoods and 5 inches in diameter for conifers, and include at least two trees per acre from the largest size classes available on site. A variety of species would be selected for within-stand species and structural diversity. In clear-cut harvest units reserve trees are retained in addition to legacy patches.

In general, all standing, live, healthy cedar, white pine, and tamarack are designated as leave trees and are not to be cut except for trees needed to be removed because of safety hazard concerns or where specified on the unit card. These trees would count towards the 6-12 leave trees except where jack pine or black spruce are required for the Three-Toed Woodpecker (O-WL-23).

Unmerchantable trees, dead standing trees and trees not designated for harvest will be left. The operator will be allowed to fell (and leave in place) a portion of these trees in areas where deemed necessary to facilitate the logging operations, as well as for safety reasons. Dead trees do not count towards the 6-12 live trees/acre reserved in clearcuts.

If seasonal ponds are identified during layout they will generally be protected with a minimum 50-foot buffer. Seasonal ponds have an identifiable edge caused by annual flooding and may be identified during dry periods by the lack of forest litter in the depression.

Invasive Plants

In areas where revegetation is required, only native or desirable non-native species that are certified as being free of noxious weed seeds would be planted or seeded.

An annual or short-lived perennial species that would serve as a cover crop may be included in the seed mix.

For occurrences of tansy, Canada thistle, spotted knapweed, leafy spurge, and St. John'swort: either re-locate skid trails, temporary roads, or landings if infested with one of these species and use will be in summer, OR treat (e.g. mow or pull) before use if use will be in summer. Plants of these species located within 50 feet of treatment units would be mowed before mechanical site preparation occurs.

Wetlands

Wetlands can be used for temporary roads and skid trails only under frozen conditions. No fill is to be placed in the wetlands. Roads in wetlands will be the minimum length and width to accomplish the treatment objectives.

Equipment will not be fueled or maintained within wetlands. Debris will not be concentrated around any wetlands.

Where the stand being harvested is an upland forest type, inclusions in the stand of lowland types (such as lowland black spruce, ash swales) would not be harvested.

Riparian Areas: Lakes, Streams, and Open Water Wetlands

Equipment crossing of stream channels will be avoided during harvest operations. If stream crossings are unavoidable they will be limited to the absolute minimum number of crossings needed to conduct the activity.

Equipment will not be fueled or maintained in riparian areas or filter strips.

Filter strips of appropriate widths will be applied to all perennial and intermittent streams, lakes, open water wetlands and seasonal ponds. Filter strip widths are dependent upon the slope of the land between activity and water body:

- 0-10% slope: 50-foot filter strip
- 11-20% slope: 70-foot filter strip
- 21-40% slope: 110-foot filter strip
- >40% slope: 150-foot filter strip

If even-age harvest occurs within 100 feet of lakes or of streams greater than or equal to 5 feet wide or within 50 feet of streams less than 5 feet wide, then an average residual basal area of 25-80 sq. ft./acre will be retained in that zone immediately adjacent to the stream. Leave trees should favor long-lived species.

If uneven-age harvest occurs within 100 feet of streams ≤ 10 feet wide or within 200 feet of lakes or of streams > 10 feet wide then an average residual basal area of 80 sq. ft./acre will be retained in that zone immediately adjacent to the stream. Leave trees should favor long-lived species.

Even-aged harvests immediately adjacent to designated trout streams or designated trout lakes will provide for the retention of an average basal area of at least 60 square feet per acre within 150 feet of the water's edge. Uneven-age harvests immediately adjacent to designated trout streams or designated trout lakes will provide for the retention of an average basal area of at least 80 sq. ft./acre within 200 feet of the water's edge.

Soils

Site preparation techniques will follow Table G-WS-8 in 2004 Forest Plan for the Superior National Forest where practicable.

Temporary roads and trails and whole tree logging are generally not permitted on ELT 12, 17, 18.

Conduct mechanical activities during normal dry period or frozen ground or remove from unit (ELT 1, 3, 10, 14, 15).

Conduct mechanical activities during frozen ground conditions or remove from unit (ELT 2, 4, 6).

Activities for timber production purposes not permitted – remove area from unit. Other activities are strongly discouraged (ELT 5, 12, 18).

Generally conduct mechanical activities on the lower end of slopes and avoid creating long uninterrupted equipment “paths” on slopes greater than 18% (possible on ELT 7 - 18).

Design management activities that employ equipment and techniques that minimize operations on slopes greater than 35% (possible on ELT 7 – 18).

Generally retain/return slash, woody debris, bark, stumps on site where appropriate during whole tree logging (ELT 7, 8, 9, 11, 12, 16, 17, 18).

Landings are generally not permitted (ELT 9, 12, 18) or are strongly discouraged (ELT 5, 17).

Visuals

In units bordering private land, no logging debris would be permitted on National Forest System land within 25 feet of a boundary with private land. In the remainder of the unit, slash would be lopped and scattered and would not exceed a height of 3 feet. The Forest Service would dispose of slash piles where appropriate.

Harvest units adjacent to lakes may receive treatments specifically designed to reduce negative visual effects.

Harvest units *along Concern Level 1 and 2* travelways, lakes and waterways, and use areas* will be designed to ensure a natural appearance of treated areas is achieved within a reasonable length of time. Treatment strategies would include:

- Layout unit to ensure that apparent size of opening is minimized (i.e. use curvilinear edges and adequately-sized leave islands).
- Visible edges should avoid abrupt transitions between cut area and adjacent uncut stand. Leave mid-story shrub-layer species in the transition zones between cut areas, and adjacent stands and leave islands.
- Within 100 feet of either side of *Concern Level 1 and 2* travelways, lakes and waterways, and use areas, slash or residue created by logging operations should be removed *to the greatest practical extent*. If not possible, then slash depth should be less than 12” in depth. In the remainder of the unit, slash would be lopped and scattered and would not exceed a height of 3 feet. Suggested techniques include, but are not limited to, complete removal, chipping, lopping and scattering, and piling and burning.
- Special road and landing design techniques. Curve access roads to prevent views into the unit from the main road.
- Retain existing and potential specimen trees, groups of trees, flowering trees and shrubs, and conifers in the immediate foreground of views from roads and trails.
- Paint marks on trees would be located so they are not visible along visually sensitive travelways or viewpoints.

Generally, newly constructed landings would be located out of sight from visually sensitive travelways or viewpoints.

Heritage Resources

If any new heritage resource sites are located during the course of project activities, work in the new site location will be immediately halted and a Heritage Resource professional consulted and appropriate mitigation measures would be carried out prior to restarting operations.

Ground disturbing activities will not be conducted adjacent to water in areas with heritage concerns as identified on the treatment unit cards and road unit cards, until a field review has been conducted by heritage resource personnel.

Standard Management Requirements for Prescribed Burns

Planning and Operations

A burn plan will be prepared that explains the objectives and conditions under which the burn can occur, an operations plan for conducting the burn, a contingency plan and a complexity analysis.

Each burn will have some type of fire (control) line or fuel break that could include the following:

- Hand Line: Control line that is established using hand tools including chainsaws. All combustible material is removed from the width of the line. Control line width is determined by fire behavior. Lines are cut to the width necessary for a fire to be held to a certain area.
- Wet Line: Control line that is created using a pump with a hose or sprinkler system to wet down an area, preventing fire from crossing. The wetting increases humidity along the line, slowing down the rate of spread of fire when fire reaches the line.
- Machine Line: Control line created by removing combustible materials by a machine such as dozer or skidder. The width of the line is determined by fire behavior, but is limited to the width of the machinery.
- Explosive Line: Combustible materials are removed from the control line area with the use of explosive devices. This creates a two to three foot wide line that may be more natural in appearance than other lines due to its irregular shape.
- Natural Barrier Line: Natural boundaries (lakes, streams, or wet bogs) are used as a control line. These areas have higher humidity and combustible materials with higher fuel moistures. Both these elements create an environment in which fire intensities decrease when in these areas, making control of fire easy. Prescribed burns are designed not to burn the boundary areas of streams and lakeshores but are allowed to creep into the area and be put out or go out on their own. Natural Barrier Lines (streams, lowland areas, etc.) or roads will be used wherever possible. This may result in the burned area being slightly larger than the harvest area.
- Road or Trail: Existing and/or old roads or trails may be used for control lines. Trails may need to be cleared to wider widths to hold fire. Old roads may need to be reopened, but will be returned to their previous status after the prescribed burn.

A spot weather forecast will be requested to ensure prescription parameters are favorable to meet objectives. A test fire will be used to determine fire behavior and whether burn objectives can be met with the observed fire behavior.

Minimum Impact Management Tactics (MIMT) will generally be used to reduce adverse effects. MIMT will be utilized in all operational and logical functions.

If any bearing markers are found, a specialist will be consulted and appropriate mitigation measure will be taken to protect them. Mitigation measure may include clearing around the bearing markers and/or not directly lighting near markers. The specific mitigation measure will be outlined in the burn plan.

Threatened, Endangered, and Sensitive Species

Follow threatened, endangered and sensitive species design features for harvest treatments during burn preparations.

Pre-burn treatments would occur around supercanopy red and white pine (potential eagle nest trees) where fuel loading is high. Treatments would involve removal of fuel concentrations from the base of trees and/or wetting of remaining fuels around the trees prior to burning.

Burn plans will include specific smoke management measures designed to prevent the incident of unacceptably high concentrations of smoke and pollutants at known or newly discovered active nest sites OR conduct activities between August 15th and February 15th which is outside of the eagle's nesting period.

Riparian

Avoid delivery of chemical retardant, foam, additive, or gray water to all surface waters and riparian areas.

Soils

Conduct mechanical fuels treatment and fire line construction during normal dry period or frozen ground or remove from unit (ELT 1, 3, 10, 14, 15).

Conduct mechanical fuels treatment and fire line construction during frozen ground conditions or remove from unit (ELT 2, 4, 5, 6).

Develop burn plan to minimize loss of forest floor using G-WS-10. Minimize forest floor disturbance during mechanical fuels treatment and fire line construction (ELT 5, 7, 8, 9, 11, 12, 16, 17, 18).

Recreation

Prescribed fire will minimize conflicts with recreation uses by 1) placing safety signs to warn recreationists of activities in the area, 2) scheduling activities during low recreation periods and 3) piling slash out of view of recreation sites and system trails.

Safety

The burn plan will specify who (publics) will be notified before a burn. Adjacent property owners and businesses will be notified as well as any individuals with health problems who have asked for prior notification.

Air Quality

Prescribed burning activities will comply with the most current version of the Minnesota Smoke Management Plan. Burn plans will use appropriate smoke modeling techniques to estimate potential smoke impacts.

Heritage Resources

Heritage resource sites within the burn area will be identified during the burn plan writing process and mitigation measures identified within the burn plan based on the type of site.

If any new heritage resource sites are located during the course of project activities, work in the new site location will be immediately halted and a Heritage Resource professional consulted.

Ground disturbing activities will not be conducted adjacent to water in areas with heritage concerns as identified on the treatment unit cards until a field review has been conducted by heritage resource personnel.

Table 2. Monitoring of Treatments

Harvest and Site Preparation Areas	
Objective	Ensure that the mitigation measures and provisions in contracts are implemented.
Methods	Visual inspection of treatment stands.
Frequency	Treatment areas would be visited on a regular basis during the length of the contract.
Responsibility	Timber Management Assistant, Silviculturalist
Sensitive Species	
Objective	Monitor known dwarf bilberry populations for Northern blue butterfly use
Methods	Complete butterfly surveys during the adult flight period.
Frequency	Survey at least once between one to three years after treatment.
Responsibility	District Biologist
Prescribed Burns	
Objective	Ensure standard management requirements and mitigation measures are followed.
Methods	Complete a Prescribed Burn Evaluation that documents how mitigations measures are followed.
Frequency	During and after each burn.
Responsibility	Fire Planner/Burn Boss
Fuels Reduction Treatments	
Objective	Ensure objectives for fuels reduction are met.
Methods	Fuel loading measurements.
Frequency	Before and after treatment.
Responsibility	Fuels Planner
Non-Native Invasive Species	
Objective	Avoid or minimize an increase in the extent of non-native plant infestation in the project area.
Methods	Monitor harvest units and newly constructed roads after harvest, site prep, or construction to determine if invasive plants have colonized areas where management activities have occurred.
Frequency	Between year one and year three following the sale
Responsibility	Forest Plant Ecologist
Temporary Roads	
Objective	Monitor to ensure that temporary roads are constructed/rehabilitated/obliterated after completion of treatment activities.
Methods	Inspect temporary road locations as they are being built, during treatments, between treatments, and after they are closed to determine if additional protection/rehabilitation efforts are needed.
Frequency	Inspect all temporary road locations that are more than ¼ mile in length.
Responsibility	Timber Management Assistant, Zone Engineer, Monitoring Crew
Forest Composition/Regeneration	

Table 2. Monitoring of Treatments

Objective	Ensure that minimum stocking standards are met in each forest type for artificial and natural regeneration treatments. Procedures and standards are located in the Forest Service Reforestation Handbook 2409.26b.
Methods	Natural and artificial regeneration areas would be surveyed for the number of acceptable trees/acre using Regional Guidelines. Stands planted to red and white pine would be checked for pruning and release need.
Frequency	Stocking surveys would be conducted after the 1 st and 3 rd growing season following reforestation treatment. Stands not expected to reach regional stocking standards after the 5 th growing season would be evaluated for a replant. Units meeting minimum stocking standards would be certified by year 5. Release and pruning needs would be evaluated at the time of stocking surveys, every other year for 10 years and after 10 years every 5 years until the branches are 9 ft. off the ground.
Responsibility	Zone Silviculturalist and Reforestation Technician